B737NG Alerting Issues – Hydraulics failure (single system)

1. Initiating Condition: Complete fluid loss for the single most critical hydraulic system (B), in cruise flight

Type	Alert or cue	Threshold for alert or cue to be presented	Confusion regarding alert or cue	Other issues with regard to alert or cue	When alert is inhibited/suppressed or when cue is masked	How alert or cue is terminated
Visual Alerts	Master caution light	Low pump pressure, difference in sensed system A/B pressures at elevator feel computer	Possible confusion about source of problem (hydraulic vs. flight control)			Pressing the M/C light
	Hyd indication on FO annunciator panel	Low pump pressure	Possible confusion about source of problem (hydraulic vs. flight control)			(Alerts/cues are not terminated)
	Flight control indication on CA annunciator panel	Difference in sensed system A/B pressures at elevator feel computer, low system B pressure sensed at flight controls	Possible confusion about source of problem (hydraulic vs. flight control)			(Alerts/cues are not terminated)
	System B engine pump low pressure light on overhead panel	Low pump pressure	Possible confusion about source of problem (hydraulic vs. flight control)			(Alerts/cues are not terminated)
	System B electric pump low pressure light on overhead panel	Low pump pressure	Possible confusion about source of problem (hydraulic vs. flight control)			(Alerts/cues are not terminated)
	Feel differential pressure light on overhead panel	Difference in sensed system A/B pressures at elevator feel computer	Possible confusion about source of problem (hydraulic vs. flight control)			(Alerts/cues are not terminated)
	System B flight control low pressure light on overhead panel	Low system B pressure sensed at flight controls	Possible confusion about source of problem (hydraulic vs. flight control)			Terminated as part of the non-normal procedure when System B Flight Control Switch is set to STBY RUD

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1. Initiating Condition: Complete fluid loss for the single most critical hydraulic system (B), in cruise flight – Cont.

Type	Alert or cue	Threshold for alert or cue to be presented	Confusion regarding alert or cue	Other issues with regard to alert or cue	When alert is inhibited/ suppressed or when cue is masked	How alert or cue is terminated
Aural Alerts	Autopilot disconnect horn if A/P B engaged	Autopilot disconnect driven by loss of hydraulic pressure	Autopilot and flight control alerts/cues are secondary events that could distract from primary event	Pilot reversion to hand-flying, even for the short period until engaging autopilot A, is a workload spike as well as a distraction.		Pilot pressing autopilot disconnect button twice
Tactile Alerts	None					
Visual Cues	Low pressure and quantity readings on System B hydraulic quantity gauges (pressure indicator needle turns amber/red, quantity shows near zero and "RF" in white) (PFD/ND version= no analog gauge, no amber/red needle)					(Alerts/cues are not terminated)
Aural Cues	None					
Tactile/ Somatic Cues	None					

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1. Initiating Condition: Complete fluid loss for the single most critical hydraulic system (B), in cruise flight – Cont.

Expected Pilot Response(s)

- Identify condition.
- Identify correct checklist.
- Perform checklist.
- Identify follow-on requirements (flaps, spoilers, landing distance, commitment to destination once LE slats extended).
- Implement follow-on requirements (flaps, spoilers, landing distance, commitment to destination once LE slats extended) at the appropriate phase of flight.

Possible sources of confusion with regard to pilot response(s)

- Not all required actions are specified in the procedures. (e.g., requirement for non-normal landing distance calculation).
- There may be a long time delay between the hydraulic failure and the implied procedures/actions, a prospective memory challenge.

How does pilot know condition is resolved/recovered?

- Completion of procedures results in stable situation but abnormal condition for landing (e.g., longer landing distance); system cannot be recovered to normal operation.

Issues with regard to multiple concurrent non-normal conditions

- Simultaneous hydraulic and flight control system conditions.
- Challenge of dealing with the concurrent and continuing failures resulting from the initiating condition (e.g., flaps, slats, autopilot, etc.).